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Trigger-Hairs of the Thistle Flower.

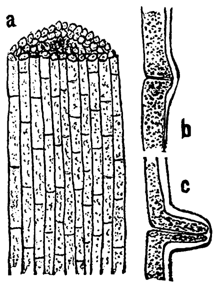
The common pasture thistle (*Cnicus altissimus*, Willd.) is a good subject for the study of sensitive stamens. It is needless to remind the readers of the BULLETIN that the stamens in the thistle flower are five in number and are united by their anthers so as to form a tube, which surrounds the upper portion of the slender style. The filaments are free from each other for some distance below the anther-ring, and in these parts is the seat of the characteristic movements.

A freshly opened flower has the tip of the style within the anther-ring. When such a blossom is touched by a pencil point or needle, the anthers are drawn down and the upper end of the style may be brought through the ring of anthers along with a quantity of pollen adhering to the spinose surface. If, after a few minutes, the flower is touched again, the motion is renewed and the ring is pulled still further down. By irritating the andrœcium upon one of the filaments and then upon another opposite it, the blossom may be caused to sway from one side to the other. In short, those slender filaments are sensitive, and when touched will contract and thereby pull the united anthers downward.

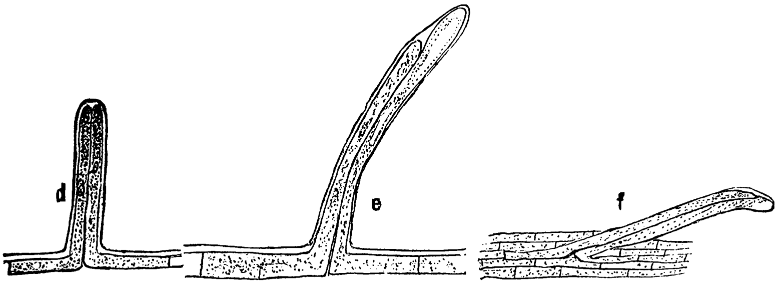
The peculiarities of the movements have led to a microscopic examination of the filaments. They consist of colorless cells, two or three times as long as broad, placed end to end and surrounding a small central bundle of six to ten closely coiled spiral vessels. In transverse section the filament is nearly triangular, the broader side being placed nearest the style. A portion of a young filament is shown at *a*, in the engraving.

Many hairs are found upon the surface of the older filaments, and exhibit a peculiar structure. Each trichome consists of two nearly parallel cells, which extend side by side to nearly the end of the outgrowth. Usually, one of these cells takes the lead, and in an old hair it forms the end, which is somewhat enlarged. The other cell is closely applied to the first and a little below the extremity of the trichome. There is a hyaline outer layer common to the two cells.

It is not difficult to determine the origin and development of these twin-celled hairs, if the filaments are taken for study while young. The surface is at first smooth, as indicated at *a*, and not unlike the exterior of ordinary filaments and similar plant structures. In slightly older stamens it is easy to recognize small enlargements at certain places, where the surface cells meet end to end. Such a minute swelling is indicated in side view at *b*. The ends of these two cells take on a lateral growth and soon become bent at right angles to the surface of the filament. The protoplasmic contents of each cell flow into the free, extended portion, and leave the old epidermal part comparatively empty. The nucleus is plainly visible in the lateral portion, when the hair is not more than half grown.



These trichomes, therefore, originate by the lateral extension of the ends of two adjoining cells, and they evidently play an important part in the movements of the filaments. The additional figures in the engraving show older stages in the development of the hair. At *c* and *d* the young outgrowths are rapidly developing, and the protoplasmic contents are quite dense near the tips of the cells. Two mature hairs are shown at *e* and *f*, the former in side view, while the latter is looking down upon the surface, and indicates the relative lengths of the cells. From the beginning of the development of the hair, there is an evident common layer over the two specialized cells. This is most apparent when the trichome attains full size, that is when about a millimeter long and 20 to 25 μ broad. The protoplasm was frequently found in rapid circulation in the full-grown cells, and



was as favorable for the investigation of this phenomenon by students as any of the standard subjects.

For the lack of a better name, that of " trigger-hairs " is given to these outgrowths. This seems to be descriptive of their use, for when they are touched by the slender legs of insects the impulse is communicated to other parts, and a downward motion of the anther-ring results. This liberates a quantity of pollen at a time and place when it will be most likely to get upon the insect's body and be thereby transferred to some other flower. The structure and the movement are undoubtedly provisions for wide fertilization, and the trigger-hairs are the means by which the visiting insect springs the trap and catches the pollen.

BYRON D. HALSTED.

Bibliographical Notes on well-known Plants.—VII.

BY EDWARD L. GREENE.

CASTALIA and NYMPHÆA.

The learned editor of the Journal of Botany has already* well taken the initiative in that work of readjusting the names of the water-lilies, which the priority of Salisbury's monograph, lately shown in this Journal† has rendered necessary.

Several North American species, not known to Salisbury, and therefore not taken up by Mr. Britten, remain to be named.

NYMPHÆA POLYSEPALA.—*Nuphar polysepalum*, Engelm. Trans. St. Louis. Acad., ii, p. 282 (1865).

NYMPHÆA RUBRODISCA.—*Nuphar rubrodiscum*, Morong. Bot. Gaz., xi, p. 167 (1886).

CASTALIA TUBEROSA.—*Nymphæa tuberosa*, Paine Catal. Pl. Oneida, p. 184 (1865). It can scarcely be doubted that certain specific names, far older than *tuberosa*, were meant for this commonest and most widely dispersed North American water-lily; some published in the latter part of the last century, by Walter and by Willdenow, and others early in the present century, by Rafinesque; but, owing to the meagre descriptions and the lack

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*James Britten, Journ. Bot., Jan., 1888, p. 6.

† E. L. Greene, BULL. TORR. BOT. CLUB, xiv, pp. 177 and 257.